KS

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/496,212	02/01/2000	Somnath Viswanath	95-333	5880

20736 7590 10/08/2003

MANELLI DENISON & SELTER
2000 M STREET NW SUITE 700
WASHINGTON, DC 20036-3307

EXAMINER	
RYMAN, DANIEL J	

ART UNIT	PAPER NUMBER
2665	11

DATE MAILED: 10/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/496,212	VISWANATH ET AL.	
	Examiner	Art Unit	
	Daniel J. Ryman	2665	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 September 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see Response, filed 9/4/2003, with respect to the rejection(s)of claim(s) 1, 11, and 16 under Chin (USPN 5,852,607) in view of Bellenger (USPN 5,949,786) have been fully considered and are persuasive, specifically, Chin does not clearly disclose combining two hash keys to form a single signature. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Kerr et al (USPN 6,243,667), Cheriton et al (USPN 6,091,725), Chang et al (USPN 5,633,858), Zaumen et al (USPN 6,118,760), and Rostoker et al (USPN 5,640,399).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3 and 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kerr et al (USPN 6,243,667) in view of Cheriton et al (USPN 6,091,725).

4. Regarding claim 1, Kerr discloses a method in a network switch of searching for a selected layer 3 switching entry for a received data packet (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 4, lines 20-34; and claim 1), the method comprising: generating hash keys according to a prescribed hash function in response to first and second layer 3 information within the received data packet (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1); and searching a table, configured for storing layer 3 hash keys that index

respective layer 3 switching entries according to the prescribed hash function, for the selected layer 3 switching entry based on a match between the corresponding layer 3 hash key and the hash key for the received data packet (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1). Kerr does not expressly disclose generating first and second hash keys according to a prescribed hash function in response to first and second information within the received data packet, respectively, or combining the first and second hash keys according to a prescribed combination into a signature for the received data packet. Cheriton discloses, in a system for identifying switching information for flows, generating first and second hash keys according to a prescribed hash function in response to first and second information within the received data packet, respectively, and combining the first and second hash keys according to a prescribed combination into a signature for the received data packet in order to have a hash function that is fast and easy to implement (Fig. 7 and col. 9, lines 48-60). It would have been obvious to one of ordinary skill in the art at the time of the invention to generate first and second hash keys according to a prescribed hash function in response to first and second information within the received data packet, respectively and combine the first and second hash keys according to a prescribed combination into a signature for the received data packet in order to have a hash key that is fast and easy to implement.

5. Regarding claim 2, referring to claim 1, Kerr in view of Cheriton discloses that the received data packet includes an Internet Protocol (IP) header, the generating step including detecting the first and second layer 3 information from the IP header as the data packet is received by a corresponding network switch port (Kerr: col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1).

6. Regarding claim 3, referring to claim 2, Kerr in view of Cheriton discloses that the detecting step includes selecting at least two of an IP source address, an IP destination address, a Transmission Control Protocol (TCP) source port, a TCP destination port, a User Datagram Protocol (UDP) source port, and a UDP destination port as the first and second layer 3 information from the IP header based on elements of each of the layer 3 switching entries used to generate the corresponding layer 3 signature (Kerr: col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1 and Cheriton: Fig. 7 and col. 9, lines 48-60).

7. Regarding claim 5, referring to claim 1, Kerr in view of Cheriton discloses verifying whether the selected layer 3 switching entry matches the received data packet (Kerr: col. 6, lines 32-57).

8. Regarding claim 6, referring to claim 5, Kerr in view of Cheriton suggests that the verifying step includes: fetching the first and second layer 3 information from the selected layer 3 switching entry; and determining whether the first and second layer 3 information from the selected layer 3, switching entry matches the first and second layer 3 information within the received data packet (Kerr: col. 6, lines 32-57). Kerr in view of Cheriton discloses hashing according to buckets and then identifying (verifying) which entry within a bucket is related to the received packet (Kerr: col. 6, lines 32-49). Examiner takes official notice that it is well known in the art to verify a hashing entry by a comparison of the values used to generate the hash key in the received packet and the entry.

9. Regarding claim 7, referring to claim 1, Kerr in view of Cheriton discloses detecting a group of the layer 3 switching entries, each having a corresponding layer 3 signature that

matches the signature for the received data packet; and verifying one entry from the group of the layer 3 switching entries matches the received data packet (Kerr: col. 6, lines 32-57).

10. Regarding claim 8, referring to claim 7, Kerr in view of Cheriton suggests that the verifying step includes: fetching the first and second layer 3 information for each of the entries of the group of layer 3 switching entries; and identifying the one entry having the corresponding first and second layer 3 information that matches the first and second layer 3 information within the received data packet (Kerr: col. 6, lines 32-57). Kerr in view of Cheriton discloses hashing according to buckets and then identifying which entry within a bucket is related to the received packet (Kerr: col. 6, lines 32-49). Examiner takes official notice that it is well known in the art to verify a hashing entry by a comparison of the values used to generate the hash key in the received packet and the entry.

11. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kerr et al (USPN 6,243,667) in view of Cheriton et al (USPN 6,091,725) as applied to claim 7 above, and further in view of Bellenger (USPN 5,949,786) in further view of Rostoker et al (USPN 5,640,399).

12. Regarding claim 9, referring to claim 7, Kerr in view of Cheriton possibly does not expressly disclose that the network switch is an integrated circuit chip, the searching step including searching a signature table located on the integrated circuit chip, and the fetching step including accessing the first and second layer 3 information from a policy table in a memory external to the integrated circuit chip. Bellenger discloses, for a flow based network switch, implementing the network switch as an integrated circuit chip, the searching step including searching a table located on the integrated circuit chip, and the fetching step including accessing the information from a policy table in a memory external to the integrated circuit chip (Fig. 2 and

col. 4, line 47-col. 5, line 15). Rostoker discloses that building a switch (router) as a single chip rather than multiple chips results in faster switching, lower costs, and smaller size for the switching unit (col. 1, lines 52-67). It would have been obvious to one of ordinary skill in the art at the time of the invention to have the network switch be an integrated circuit chip, the searching step include searching a signature table located on the integrated circuit chip, and the fetching step include accessing the first and second layer 3 information from a policy table in a memory external to the integrated circuit chip in order to have faster switching, lower costs, and a smaller switching unit.

13. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kerr et al (USPN 6,243,667) in view of Cheriton et al (USPN 6,091,725) as applied to claim 1 above, and further in view of Zaumen et al (USPN 6,118,760).

14. Regarding claim 10, referring to claim 1, Kerr in view of Cheriton does not expressly disclose forwarding an identifier specifying the selected layer 3 switching entry from a network switch port, having received the received data packet, to layer 3 switching logic within the network switch. Zaumen discloses, in a network element forwarding memory, forwarding an identifier specifying the selected layer 3 switching entry from a network switch port, having received the received data packet, to layer 3 switching logic within the network switch in order to have the network switching logic within the network switch determine switching decisions if the port does not contain an entry for the packet (Fig. 1 and col. 5, line 15-col. 6, line 16, esp. col. 5, line 49-col. 6, line 14) where, as broadly defined, an "identifier specifying the selected layer 3 switching entry" could be anything, including a packet, a header of the packet, or the hash values, that could be used to identify the switching entry. It would have been obvious to one

of ordinary skill in the art at the time of the invention to forward an identifier specifying the selected layer 3 switching entry from a network switch port, having received the received data packet, to layer 3 switching logic within the network switch in order to have the network switching logic within the network switch determine switching decisions if the port does not contain an entry for the packet.

15. Claims 11, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kerr et al (USPN 6,243,667) in view of Zaumen et al (USPN 6,118,760).

16. Regarding claim 11, Kerr discloses a method of identifying a layer 3 switching decision within an integrated network switch having a plurality of network ports and switching logic (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 4, lines 20-34; and claim 1), the method including: storing, in a first table, layer 3 switching entries that identify data packet types based on layer 3 information, respectively, each layer 3 switching entry identifying a corresponding layer 3 switching decision to be performed by the integrated network switch (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1); generating an entry signature (hash key) for each of the layer 3 switching entries based on a prescribed hash operation performed on first and second portions of the corresponding layer 3 information (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1); generating a packet signature (hash key) for a data packet based on performing the prescribed hash operation on the first and second portions of the layer 3 information in the corresponding received data packet (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1); and identifying one of the layer 3 switching entries for switching of the received data packet based on detecting a match between the packet signature and the

corresponding entry signature (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1). Kerr does not expressly disclose that a network switch port performs the generating and identifying steps. Zaumen teaches, in a network element forwarding memory, having a network switch port perform the generating and identifying steps (Fig. 1 and col. 5, line 15-col. 6, line 16, esp. col. 5, line 49-col. 6, line 14) where it is implicit that this architecture allows for distributed routing, such that a central table is not required for all table look-ups. It would have been obvious to one of ordinary skill in the art at the time of the invention to have a network switch port performs the generating and identifying steps in order to use many smaller, slower tables instead of a single, high-speed table.

17. Regarding claim 14, referring to claim 11, Kerr in view of Zaumen discloses that the step of identifying one of the layer 3 switching entries includes: searching a signature table within the integrated network switch for one of the entry signatures matching the packet signature; retrieving from the signature table an address location of the one layer 3 switching entry corresponding to the matched entry signature; and accessing the one layer 3 switching entry from an external memory based on the retrieved address location (Kerr: col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; col. 6, line 32-55; and claim 1) where the signature table is the bucket and the external memory is the entries linked within the bucket.

18. Regarding claim 15, referring to claim 14, Kerr in view of Zaumen discloses that the step of identifying the one layer 3 switching entry includes verifying that the one layer 3 switching entry matches the received data packet (Kerr: col. 6, lines 32-57).

19. Claims 12, 13, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kerr et al (USPN 6,243,667) in view of Zaumen et al (USPN 6,118,760) in further view of Cheriton et al (USPN 6,091,725).

20. Regarding claim 12, referring to claim 11, Kerr in view of Zaumen discloses that the step of generating an entry signature includes: selecting at least two of an IP source address, an IP destination address, a Transmission Control Protocol (TCP) source port, a TCP destination port, a User Datagram Protocol (UDP) source port, and a UDP destination port as the first and second portions of the corresponding layer 3 information (Kerr: col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1). Kerr in view of Zaumen does not disclose generating first and second hash keys for the first and second portions of the corresponding layer 3 information in the layer 3 switching entry based on the prescribed hash operation; and combining the first and second hash keys to form the entry signature. Cheriton discloses, in a system for identifying switching information for flows, generating first and second hash keys according to a prescribed hash function in response to first and second information within the received data packet, respectively and combining the first and second hash keys according to a prescribed combination into a signature for the received data packet in order to have a hash key that is fast and easy to implement (Fig. 7 and col. 9, lines 48-60). It would have been obvious to one of ordinary skill in the art at the time of the invention to generate first and second hash keys according to a prescribed hash function in response to first and second information within the received data packet, respectively and combine the first and second hash keys according to a prescribed combination into a signature for the received data packet in order to have a hash key that is fast and easy to implement.

21. Regarding claim 13, referring to claim 12, Kerr in view of Zaumen in view of Cheriton discloses that the step of generating a packet signature includes: selecting the at least two of an IP source address, an IP destination address, a Transmission Control Protocol (TCP) source port, a TCP destination port, a User Datagram Protocol (LTDP) source port, and a UDP destination port as the first and second portions of the corresponding layer 3 information in the received data packet; generating third and fourth hash keys for the first and second portions of the corresponding layer 3 information in the received data packet based on the prescribed hash operation; and combining the third and fourth keys to form the packet signature (Kerr: col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1 and Cheriton: Fig. 7 and col. 9, lines 48-60).

22. Regarding claim 16, Kerr discloses an integrated network switch configured for executing layer 3 switching decisions (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 4, lines 20-34; and claim 1), comprising: an index table that includes addresses of layer 3 switching entries that identify respective data packet types based on layer 3 information, the index table also including for each address entry a corresponding entry signature representing a combination of selected first and second portions of the corresponding layer 3 information hashed according to a prescribed hashing operation (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1); a plurality of network switch ports (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1); a frame identifier configured for obtaining the first and second portions of layer 3 information within a data packet being received by the network switch port (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1); a flow module configured for identifying one of the layer 3

switching entries for execution of the corresponding layer 3 switching decision for the data packet based on a determined correlation between the packet hash and the corresponding entry hash (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1); and layer 3 switching logic for executing the layer 3 switching decision for the data packet based on the corresponding identified one layer 3 switching entry (col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1). Kerr does not expressly disclose that each port contains a frame identifier and a flow module. Zaumen teaches, in a network element forwarding memory, having a network switch port contain a frame identifier and a flow module (Fig. 1 and col. 5, line 15-col. 6, line 16, esp. col. 5, line 49-col. 6, line 14) where it is implicit that this architecture allows for distributed routing, such that a central table is not required for all table look-ups. It would have been obvious to one of ordinary skill in the art at the time of the invention to have a network switch port contain a frame identifier and a flow module in order to use many smaller, slower tables instead of a single, high-speed table. Kerr in view of Zaumen does not disclose that the flow module is configured for generating a packet signature by generating first and second hash keys for the first and second portions from the data packet based on a prescribed hash operation. Cheriton discloses, in a system for identifying switching information for flows, generating first and second hash keys according to a prescribed hash function in response to first and second information within the received data packet, respectively and combining the first and second hash keys according to a prescribed combination into a signature for the received data packet in order to have a hash key that is fast and easy to implement (Fig. 7 and col. 9, lines 48-60). It would have been obvious to one of ordinary skill in the art at the time of the invention to have the flow module be configured for generating a packet

signature by generating first and second hash keys for the first and second portions from the data packet based on a prescribed hash operation in order to have a hash key that is fast and easy to implement.

23. Regarding claim 17, referring to claim 16, Kerr in view of Zaumen in view of Cheriton discloses that the flow module, in response to determining the correlation between the packet signature and the entry signature, fetches selected portions of the layer 3 information from the one layer 3 switching entry for verification that the one layer 3 switching entry matches the data packet (Kerr: col. 6, lines 32-57).

24. Regarding claim 18, referring to claim 16, Kerr in view of Zaumen in view of Cheriton discloses that the frame identifier selects at least two of an IP source address, and IP destination address, a Transmission Control Protocol (TCP) source port, a TCP destination port, a User Datagram Protocol (LTDP) source port, and a UDP destination port as the first and second portions of layer 3 information within the data packet (Kerr: col. 1, lines 48-61; col. 2, line 38-col. 3, line 20; col. 3, line 40-col. 4, line 11; and claim 1).

25. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kerr et al (USPN 6,243,667) in view of Zaumen et al (USPN 6,118,760) in further view of Cheriton et al (USPN 6,091,725) as applied to claim 16 above, and further in view of Bellenger (USPN 5,949,786) in further view of Rostoker et al (USPN 5,640,399).

26. Regarding claim 19, referring to claim 16, Kerr in view of Zaumen in view of Cheriton does not expressly disclose an external memory interface configured for providing access by the flow module to the one layer 3 switching entry, stored in a memory external to the integrated network switch, based on the corresponding address entry. Bellenger discloses, for a flow based

network switch, implementing the network switch as an integrated circuit chip, where an external memory interface is configured for providing access by the flow module to a switching entry (Fig. 2 and col. 4, line 47-col. 5, line 15). Rostoker discloses that building a switch (router) as a single chip rather than multiple chips results in faster switching, lower costs, and smaller size for the switching unit (col. 1, lines 52-67). It would have been obvious to one of ordinary skill in the art at the time of the invention to have the network switch be an integrated circuit chip and to have an external memory interface configured for providing access by the flow module to the one layer 3 switching entry, stored in a memory external to the integrated network switch, based on the corresponding address entry in order to have faster switching, lower costs, and a smaller switching unit.

Conclusion

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Chang et al (USPN 5,633,858) see col. 1, line 57-col. 2, line 10 which discloses verifying if a hash entry matches a received data packet in order to ensure that the packet is processed properly.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Ryman whose telephone number is (703)305-6970. The examiner can normally be reached on Mon.-Fri. 7:00-5:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (703)308-6602. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

Daniel J. Ryman
Examiner
Art Unit 2665

DJR2

Daniel J. Ryman

HUY D. VU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600